batteries can cause heat explosions and fire?

MR. HAFNER: Objection to form.

A Well, I cannot talk about explosions, because Sony has devices, Sony cells have devices will not allow the battery to explode, but I can describe how can they overheat.

BY MR. BERGENN:

Q And when they overheat can they have thermal runaways?

A I don't know what you mean by the term thermal runaway.

Q Well, is it your testimony that you don't know of a single instance of a lithium ion battery produced by Sony or one of its contractors that resulted in a fire?

A No, that's not what I said.

Q Okay. So how is it that it results in a fire? Describe the process by which a battery results in a fire?

A Well, one issue could be overcharging, right, that is if a mechanism that could, the battery could be overcharged. Many, many things have to happen for that battery or cell to overcharge.

Q And when it over charges, or something happens to it and it gets to a certain point, how is

it that it goes from that point into fire? What makes the fire?

A The electrolyte, once it starts to reach a certain temperature, it becomes a gas, and if the gas is expelled from the cell, that might ignite.

Q Right. And when gas ignites, it causes fire?

A Correct.

Q And when gas ignites in a contained environment where the pressure increases, that causes an explosion?

MR. HAFNER: Objection to form.

BY MR. BERGENN:

Q That's the basic physics, right?

A Yes.

Q Can you think of any method by which, in an enclosed environment, gas is ignited and there's no explosion?

A Yes. If there is a safety vent, for example, that breaks when the pressure reaches a certain point, it will escape through the opening and not explode, explode meaning break in the can. So that will not happen.

Q So when it breaks, but doesn't breaks the can --

A Correct.

Q That's because it shoots out the end?
A Correct.
Q And when it shoots out the end, what's the word you use to describe that phenomenon?
A Venting.
Q Oh, venting. And when it vents, does it vent expelling superheated fire.
A Superheated fire?
Q What's the temperature when it vents?
A I would say it's over 2000 degrees.
Q And what is it that vents?
A The gas from the electrolyte becoming, because the rise in temperature will become gas, and that will expel.
Q What else comes out besides gas? At 2000 degrees --
A You might have --
Q -- does copper or aluminum melt?
A Yes, you might have particles. Sorry.
Q And when the gas ignites, within the gas are these other metals, correct?
A Correct.
Q Every lithium ion battery consists at that point of gas and metals?
MR. HAFNER: Objection to form.

A Yes.
BY MR. BERGENN:
Q And when that gas ignites to 2000 degrees, those metals vent with the gas, don't they?
A It's possible, yes.
Q Generally that's what happens?
A Yes.
Q When it doesn't happen, that would be an exception, correct?
A The depends on the event, how the event occurs inside the cell, what the short circuit is, and the intensity of the current path.
Q Okay. But generally speaking, when a cell vents at 2000 degrees, it expels the gas and the liquid metal, correct?
A Yes, generally.
Q And that means liquid metal is being propelled outside the battery at that point, correct?
MR. HAFNER: Objection to form.
A Maybe, maybe not.
BY MR. BERGENN:
Q Right. Generally speaking. I can't cover every single one here, but generally speaking when you've got 2000 degree ignited gas, and it is surrounding metal that has a temperature of being

liquefied substantially below 2000 degrees, correct?

A Correct.

Q So generally speaking when those things ignite, they expel liquid metal?

A Well, again, it depends on the situation. If you have a cell here and another cell in a series with that in place immediately adjacent to that, that is going to contain expulsion of gases.

Q Right. So when the gas expels with the metal and there is no next cell, or there is no, I guess, boundary, there is no intervening metal, that's going to shoot out, correct?

A If you consider the cell by itself in the surface, yes, I would agree with that.

Q Okay. So how is it that lithium ion cells sometimes have that experience? What causes that?

A To my knowledge what could cause that experience is a short circuit inside the cell when the separator is perforated by a particle that has been introduced, and that could be the cause, or an internal short circuit in case of some cells that are not manufactured to the correct standard.

Q And that's very rare, correct, when that happens. That's not a common phenomenon. It's not like a certain percentage of lithium ion cells are

going to just have this phenomenon. It's a very rare occurrence, correct?

A Correct.

Q And what you've described is a particle or a short circuit due to manufacturing not made to code, or made to specifications?

A Standards, yes.

Q Right. Are there any other things that have happened to your knowledge that have resulted in these expulsions of 2000 degree gas via lithium ion cell?

A When a battery explodes already to a fire and it discharges and is exposed to a fire, an external fire, could potentially short circuit inside and cause the same effect, I've seen that.

Q So those are three different things that you've identified. In your experience, are there any other circumstances where lithium ion batteries have been superheated and expelled the 2000 degree gas with the inside of the cell?

A Not that I recall at the moment.

Q Have you ever read anything at SEL that lists the various potential things that can cause this phenomenon?

A No.

Q So I don't have to keep calling it this

Q Is it your testimony that there has never been a Sony cell or battery that had a defect?
A I didn't say that.
Q I'm asking you.
A No.
Q Is it your testimony that there have been Sony cells and batteries with defects?
A Yes.
Q Can you describe the defects with which you are familiar?
A My understanding is that, and that's the reason for the recall in 2006, that there were some cells in which particles were introduced during the manufacturing process, and that could be considered a defect.
Q And why? Why is that a defect to have particles introduced during the manufacturing?
A If the particles are over a certain size, they can perforate the separator and cause a short circuit internal to the battery.
Q And what happens if that happens?
A It depends where the particle is located.
Q Right. And describe the range of things that have happened when particles have been introduced during their manufacture?

A Well, it could be something just from a failure, the cell stopped to work, and it could be something as to venting. If the particle is in the right location, it could be venting.

Q And how is it that the particle results in venting?

A Because it perforates the separator, and it produces a short circuit.

Q And when it produces a short circuit, why does that result sometimes in venting?

A Because it generates internal heat, and there could be, the short circuit could increase in size given the hole in the separator, could increase in size. The separator is typically itself healing, but if the particle exceeds certain size, it won't self-heal, and it will cause enough heat, the short circuit will cause enough heat to have the cell vent.

Q And that has happened before?

A Yes.

Q And that happened enough times to result in a recall?

A Yes.

Q And when was it that you first learned that that happened?

A I heard about it -- I don't know the exact